massive, a character which is well suited to growth in subaërial and dry situations; while in the former the whole structure is relatively delicate, and less complex, and suited rather to a subaquatic habitat. A parallel progression from the simpler to the more complex is to be traced also in the prothallus or oophyte of these plants, and the general conclusion is drawn from these observations that the series of the Filicineæ illustrates—perhaps more clearly than any other phylum—the rise of a race of plants from the aquatic to the subaërial habit. Nevertheless they still retain in the mode of fertilization the trace of the aquatic habit, which is only lost in the higher Phanerogamic plants, where the pollen-tube renders unnecessary the presence of fluid water at the moment of fertilization.

The paper by Prof. Hartog, on the structure of *Saprolegnia*, contained an account of the structure of the nucleus and of its division, and also of some remarkable facts concerning fertilization; careful observation showed that nothing whatever passed from the antheridium into the oosphere or the oosporangium during fertilization.

In the paper entitled "Contributions to our Knowledge of the Fresh-water Oligochæta," by Mr. F. E. Beddard, the most important new point was the description of the sexual organs of *Dero*, which have not yet been described; they were stated to agree entirely with those of *Nais*, except that there were no genital setæ.

Mr. Robert Irvine and Dr. G. Sims Woodhead, in their paper on the secretion of carbonate of lime by animals, stated that hens supplied with any salt of lime produce normal egg-shells composed of carbonate of lime. They cannot make shells from magnesium or strontium carbonate. Crustacea, such as crabs, cannot assimilate sulphate of lime from the sea-water to form their exo-skeleton. They can form their shells from calcium chloride. In the egg-shell, the organic and inorganic material are both secreted by cells separated from the epithelial cells. In the crab-shell, the organic material (chitin) remains attached to the epithelial cells, and in this the lime salts are deposited, probably by a process of dialysis, while in the case of bone, the cells are not epithelial in character, the matrix, though separate, is closely associated with the cells, especially during its formation, and the lime is deposited in the matrix, apparently by a process of dialysis. Phosphoric acid, combined with alkalies and alkaline earths, acts as the carrier of the lime salt to the secreting cells. While in the blood, the lime salt is as a phosphate, it may be thrown out mostly as carbonate on meeting nascent carbonic acid at the secreting cells. Lime salts, of whatever form, are deposited only in vitally inactive tissue, such as bone matrix, chitin, or tissues that have undergone degeneration. Although the tissue be dead, deposition may go on. Carbonate of lime may be formed in sea-water as follows: the carbonate of ammonia produced by the decomposition of the effete products of animals, urea, &c., decomposes a portion of the sulphate of lime in the sea-water with the formation of carbonate of lime equivalent in amount to the carbonate of ammonia thus formed.

Sir John Lubbock read a paper on the shape of the oak-leaf and the leaves of the Guelder roses. The leaf of the evergreen oak is small in comparison with that of the English oak, and its margin is entire. During winter the leaf is protected by scales, which are not proportionately larger in the English oak; hence the leaf must be more folded in the bud, and the peculiar shape of the leaf may be shown by models to be due to the shortness of the bud in comparison with the length of the leaf; moreover, the two sides of the leaf are differently curved, hence the asymmetry. With regard to the Guelder roses, there are two species in this country which have very dissimilar leaves: in one form they are oval and very hairy when young; in the other they are trilobate, smooth, and furnished with stipules. In the former species the hairy covering protects the young leaves, but in the latter the outer leaves become tough and leathery, and encircle and protect the younger leaves; this brings about a close packing of the young leaves, which are folded so as to be stowed away in a small space; hence their trifid form. The presence of stipules is always associated with a lobed form of the leaf, and they apparently assume their thread-like form to fill up a space which would otherwise be left empty in the bud.

The object of the paper on the placentation of the dugong, by Sir W. Turner, was to put on record the fact that the placenta of the dugong is zonary and *non*-deciduate; it differs, therefore, in the latter character from the elephant, and in the former from its near ally the manatee.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

OXFORD.—The summary statement of lectures delivered during the past year shows that about ninety-five courses of lectures have been given in the subjects of the Faculty of Natural Science.

We may note the following among the lectures announced for this term:—

Prof. Sylvester will lecture on the resolution in integers of systems of linear equations with rational coefficients, and will reproduce an unpublished course of lectures given at King's College in 1869, on the relation of the theory of compound partitions of numbers to certain geometrical theories. Prof. Pritchard will lecture on planetary theory and on the Constellations.

Prof. Clifton, magnetism; Mr. Selby, the mathematical theory of electrostatics and magnetism.

Prof. Odling, diacidic olefine acids.

Prof. Green, stratigraphical geology and physical geology; Mr. Badger, palæontology.

Prof. Burdon Sanderson is unfortunately prevented from lecturing by serious illness, and Mr. Gotch and Dr. Haldane will lecture for him.

Dr. Tylor lectures on the development of religions, and Mr. Mackinder on the physical geography of the British Islands.

In the Medical Faculty, Mr. Thomson lectures on osteology, Dr. Collier on the methods of diagnosing disease of the heart, and Mr. Morgan on clinical surgery.

Scholarships and Exhibitions in Natural Science are offered for competition before Christmas by Balliol, Christ Church, and Trinity, and by Keble College.

CAMBRIDGE.—The Vice-Chancellor (Dr. Searle), in laying down his office, was able to relate that the executors of Mr. Newall had agreed to the conditions proposed to be made by the Senate as to the great telescope to be given to the University. The expense of transit, re-erection, and permanent work in promotion of stellar physics will be considerable.

The election of Mr. Jenkinson as Librarian gives the University an official who, in addition to his well-known classical and literary accomplishments, has no mean scientific qualifications. He was for some time Curator in Zoology, and is a member of the Botanic Gardens Syndicate and of the Council of the Cambridge Antiquarian Society. Men of science cannot regret Mr. Clark's retirement from the contest, for he literally could not be spared from the Museums, though otherwise highly qualified for the Librarianship.

There are very few new features in the science lectures this term. The list is, if anything, slightly longer, and would fill two of our pages; but there is nothing in it calling for special comment.

SCIENTIFIC SERIALS.

THE *American Meteorological Journal* for September contains (1) an article by Prof. H. A. Hazen on cloud formation. The author considers that theories of storm generation and cloud formation are unsatisfactory. He has made a number of experiments, both with dry and damp air, on the formation of cloud by the cooling produced by exhaustion, the result being that he finds the amount of the latter to be only about one-fourth of what theory would indicate. The results obtained with dry and moist air were almost exactly the same. (2) State tornado charts for Alabama and Ohio, by Lieutenant Finley. (3) An article on the verification of weather forecasts, by H. Helm Clayton. He points out that all the methods adopted admit of considerable latitude in interpreting phenomena, so that the same forecasts, when verified by different persons, may differ widely as to the percentage of success, and he suggests an arrangement which may be applied to areas as well as to single stations, and which, at the same time, might be useful in studying the relative frequency of each phenomenon. (4) The distribution of wind velocities in the United States, by Dr. F. Waldo, deduced from the records of the self-recording anemometers at the stations of the Signal Service. In this article, which is unfinished, the author deals exclusively with the values of the constants derived from various anemometrical experiments in Germany and Russia.

THE *Meteorologische Zeitschrift* for September 1889 contains a discussion, by Dr. J. Hann, of Parts iv. and v. of "Contributions to our Knowledge of the Meteorology of the Arctic

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Regions," lately published by the Meteorological Council (see NATURE, vol. xxxviii. p. 625). He fully recognizes the value of this work, and the importance of a similar discussion of the observations collected during later expeditions. Dr. J. M. Pernter contributes an epitome of the Report of the Krakatão Committee of the Royal Society. Among the smaller "communications" may be mentioned (1) the description of a new registering apparatus for rainfall and wind, with electrical connections, in which the influence of the elements themselves is made to move the paper form, and the clock to record the indications, instead of the usual plan of the clock moving the paper (the principles of such an instrument were also referred to in the *Zeitschrift für Instrumentenkunde*, 1882, p. 206, and 1884, p. 300); (2) a note by Dr. Köppen, on the construction of isobars reduced to the level of 2500 metres, instead of to sea-level (the proposed plan is especially intended for use over large areas, where the differences of pressure and the altitudes of the stations are considerable, as, for instance, in Austria).

SOCIETIES AND ACADEMIES.

PARIS.

Academy of Sciences, October 7.—M. Des Cloizeaux, President, in the chair.—Complement to the theory of thin weirs extending throughout the breadth of the bed of a water-course; approximate calculation, for depressed sheets, of the non-pressure at their lower face, according to the elevation of the surface down-stream, by M. J. Boussinesq.—New observations on the reciprocal displacements between oxygen and the halogens, by M. Berthelot. Fuming hydrochloric acid, in contact with air, does not yield chlorine, even after prolonged exposure to sunlight; but the addition of certain metallic chlorides (especially manganous chloride) causes it to react with oxygen, forming chlorine and water. This change is due to the formation and decomposition of a perchloride of manganese. Its bearing on thermo-chemical theory is pointed out.—On Raffinose, by the same. He describes a new hydrate, got by crystallization from aqueous alcohol, the formula being $C_{18}H_{32}O_{16} \cdot 6H_2O$ (the former one had $5H_2O$). Raffinose ferments wholly, with good beer-yeast. But with weak baker's yeast, the process stops, after forty-eight hours, when about a third has been affected. The raffinose seems to be broken up into a glucose, which ferments and disappears, leaving either a second sugar of the saccharose family, with a certain reducing power, or a mixture of two glucoses (one reducing).—Effects of an intermittent wind in soaring, by M. Marey. A ball let off at the top of a board with sinuous profile, and descending series of heights, surmounts all those heights by gravity. Let off from the lowest height, it may be got back to the highest, if, each time it is rising, the board be jerked horizontally in the opposite direction. This experiment, suggested by M. Bazin, is applied to the case of the bird; an intermittent wind, acting as the bird rises, may enable it to gain height after each descent. (The movements of the ball M. Marey represents by photo-chronography.)—On transformism in micro-biology; limits, conditions, and consequences of the variability of *Bacillus anthracis;* researches on descendant or retrograde variability, by M. A. Chauveau. By continuous action of compressed oxygen on the *Bacillus*, one can obtain less and less resistant races or types, especially sensitive to the action of the attenuating agent, till at length they are found unable to vegetate in contact with it. Up to this limit, however, the *Bacillus* is pathogenic. It loses virulence, but keeps the vaccinal property throughout its existence. These new characters may be easily maintained by cultivation. And these special types of the *Bacillus* perhaps exist in nature.—On the invariants of certain differential equations and on their applications, by M. R. Liouville.—Determination of the difference of longitude between Paris and Madrid; an international research, carried out by MM. Esteban and Bassot. In 1863, MM. Le Verrier and Aguilar determined this difference indirectly, by measuring those between Paris and Biarritz, and Biarritz and Madrid. A direct determination was very desirable for geodetic purposes; and this, made with Brunner's portable meridian circles, and comparison of pendulums by chronographic inscription of telegraph signals (without relays) yields the value 24m. 6·00s. as against 24m. 6·08s. (Le Verrier).—On surfaces of which the ds^2 may be brought in various ways to the type of Liouville, by M. G. Kœnigs.—Synthesis of some oxygenated selenium compounds, in the aromatic series, by M. C. Chabrié.—Researches on fucusol, by M. Maquenne. This substance, obtained by Stenhouse from seaweed, proves to be a mixture of furfurol (10 parts) and methylfurfurol (1 part); the name should therefore be given up.—On the physiology of the trachea, by M. Nicaise. In normal, calm respiration, the trachea remains contracted, with unvarying diameter, the ends of the rings nearly in contact, also the borders. In strong respiration (shouting, singing, &c.) the trachea dilates and elongates in respiration, the larynx rising; the reverse occurs in inspiration. He succeeded in registering these rhythmic movements. The dilatation is greatest at the upper part; it is permitted by the membranous portion, and is due to mechanical pressure of air. Compression of air by the dilated trachea plays an important part in singing, &c.—On the pathology of nerve-terminations of muscles of animals and of man, by MM. Babes and Marinesco. By a new colouring method, they are able to follow the minute structure, and its alterations in atrophy, hypertrophy, segmentation, &c.—On a new *Proteromonas*, by M. J. Kunstler. This, found in the gray lizard of Gascony, is of S shape, and has a very long flagellum, two to five times as long as the body, starting usually from a globular enlargement. The name proposed is *P. dolichomastix*.—On the presence of pectic compounds in plants, by M. L. Mangin. These substances, he finds, play an important, if not preponderating *rôle* in the formation and growth of membrane; and he indicates methods of detecting their presence.

BOOKS, PAMPHLETS, and SERIALS RECEIVED.

The Habits of the Salmon: J. P. Traherne (Chapman and Hall).—On the Creation and Physical Structure of the Earth: J. T. Harrison (Longmans).—The Bermuda Islands: A. Heilprin (Philadelphia).—The Flora of Suffolk: W. M. Hind (Gurney and Jackson).—Steam-Engine Design: J. M. Whitham (Macmillan).—A Text-book on Steam and Steam-Engines, 5th edition: Prof. Jamieson (Griffin).—English Idyls: P. H. Emerson (Low).—Coloured Analytical Tables: H. W. Hake (Philip).—Manual of Orchidaceous Plants, Part 5: Masdevallia (Veitch).—A Life of John Davis, the Navigator: C. R. Markham (Philip).—The Science of Rights: J. G. Fichte; translated by A. E. Kroeger Trübner).—The Science of Knowledge: J. G. Fichte; translated by A. E. Kroeger (Trübner).—Chambers's Encyclopædia, new edition, vol. iv. (Chambers).—Wayside Sketches: F. E. Hulme (S.P.C.K.).—Diseases of Plants: H. M. Ward (S.P.C.K.).—The Zoo, 2nd series: Rev. J. G. Wood (S.P.C.K.)—The Story of a Tinder-box: C. M. Tidy (S.P.C.K.)—Time and Tide: Sir R. S. Ball (S.P.C.K.)

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